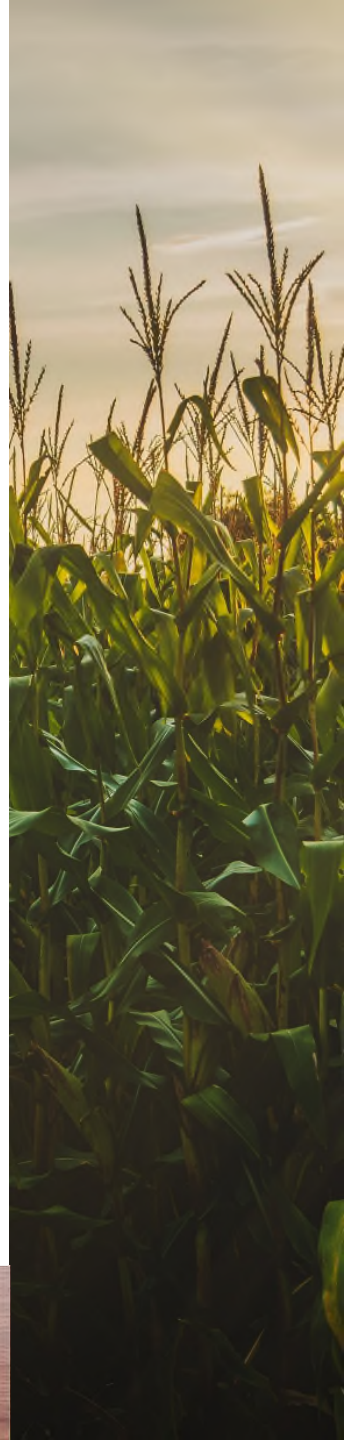


Glyphosate and AMPA in streams and rivers in the U.S., 2015-2017

NWQMC March 27, 2019

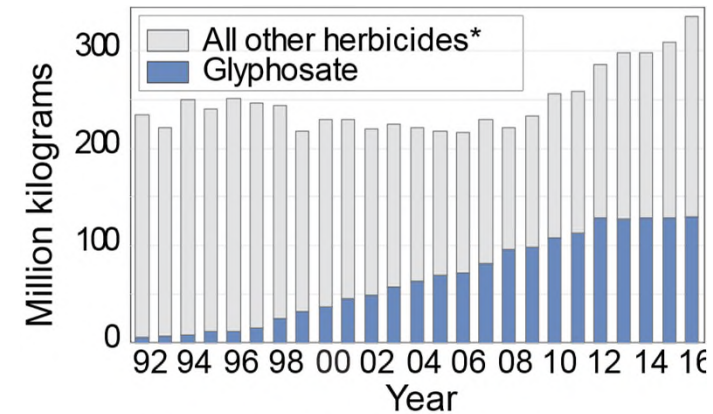
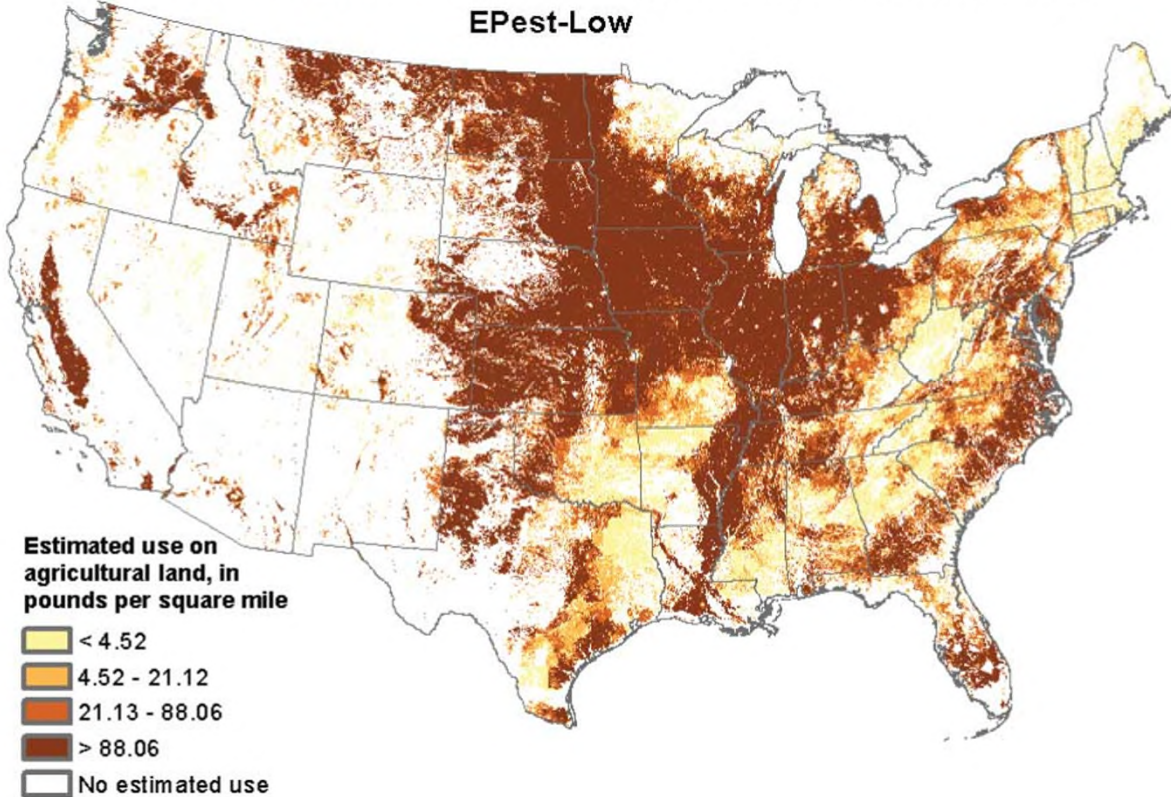
by Medalie, Baker, Shoda, Stone



Why do we care about glyphosate?

Estimated Agricultural Use for Glyphosate , 2016 (Preliminary)

EPest-Low

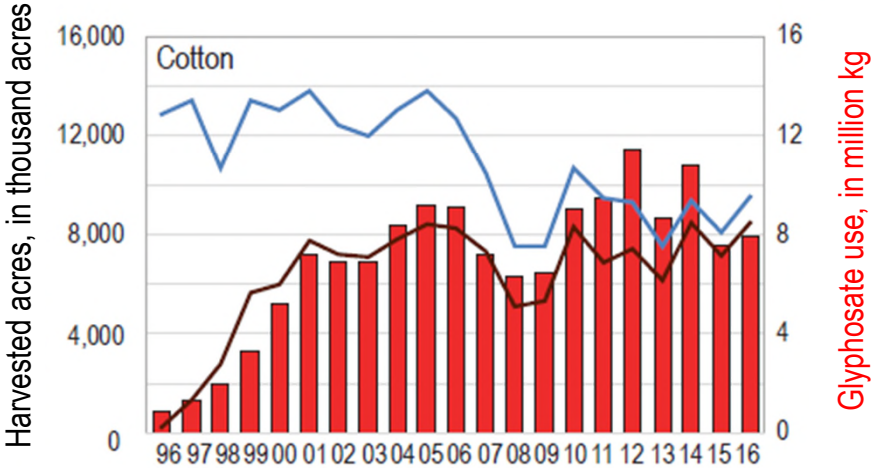
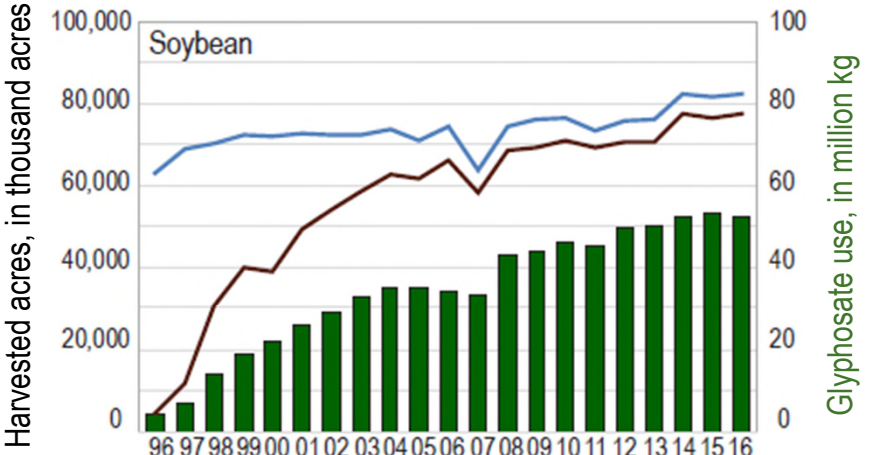
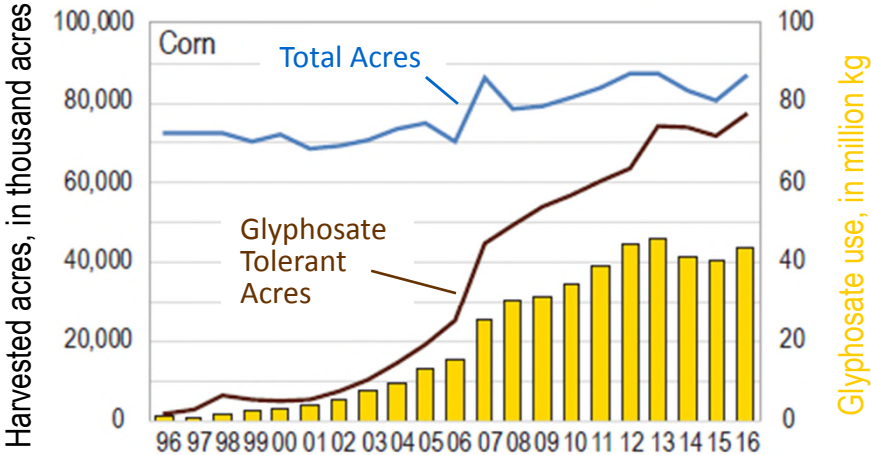


* Does not include inorganic compounds

Non-agricultural glyphosate use
estimated as 10% of total use



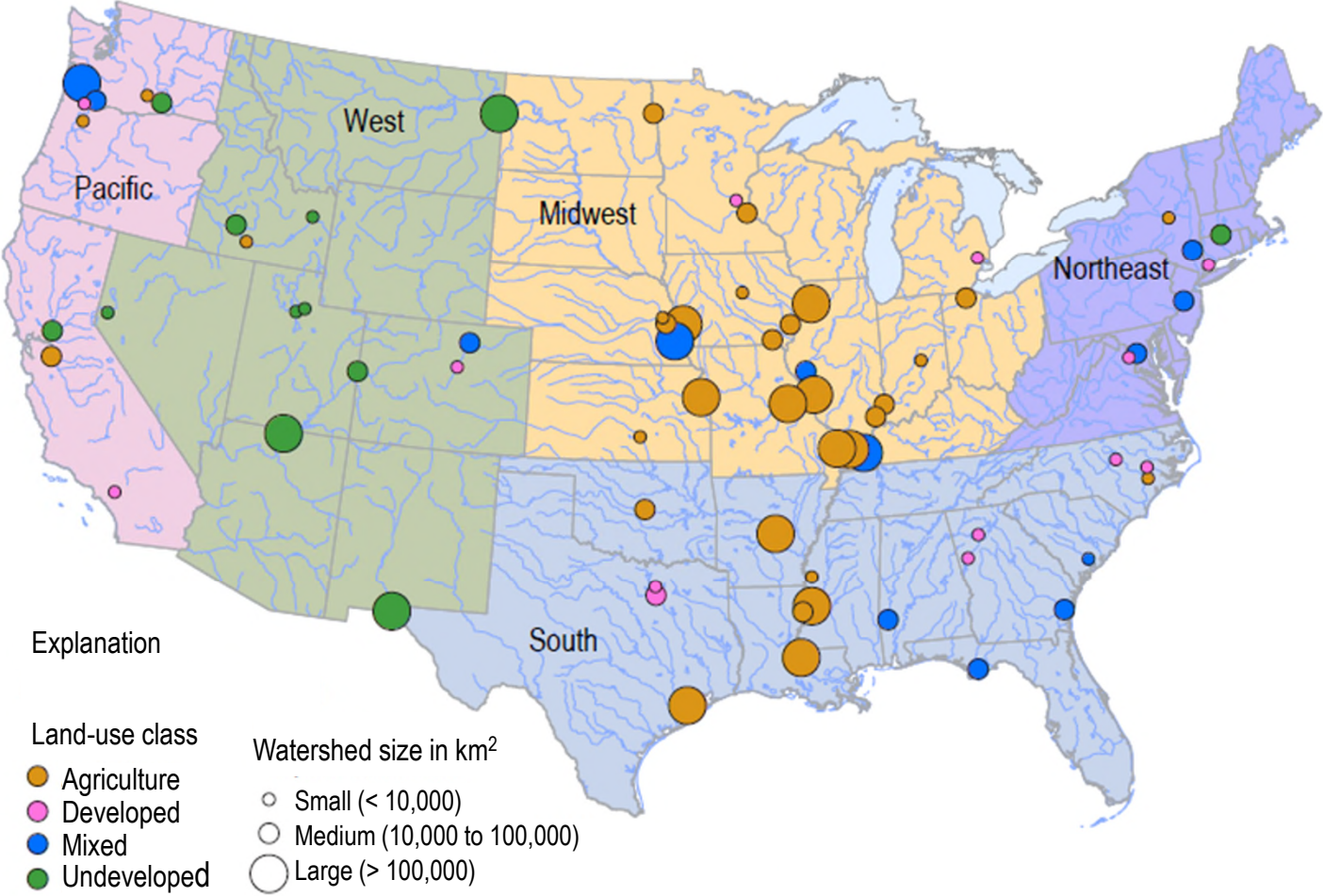
Glyphosate use by:
CROP



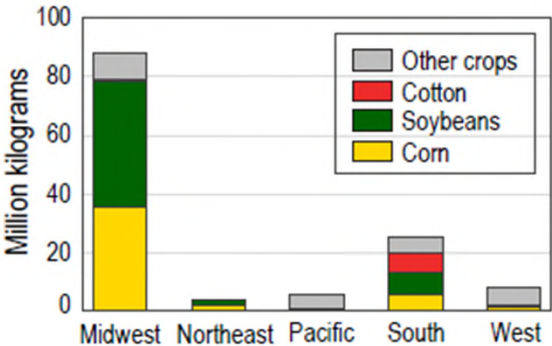
— Total Acres Harvested
— Glyphosate Tolerant Acres Harvested



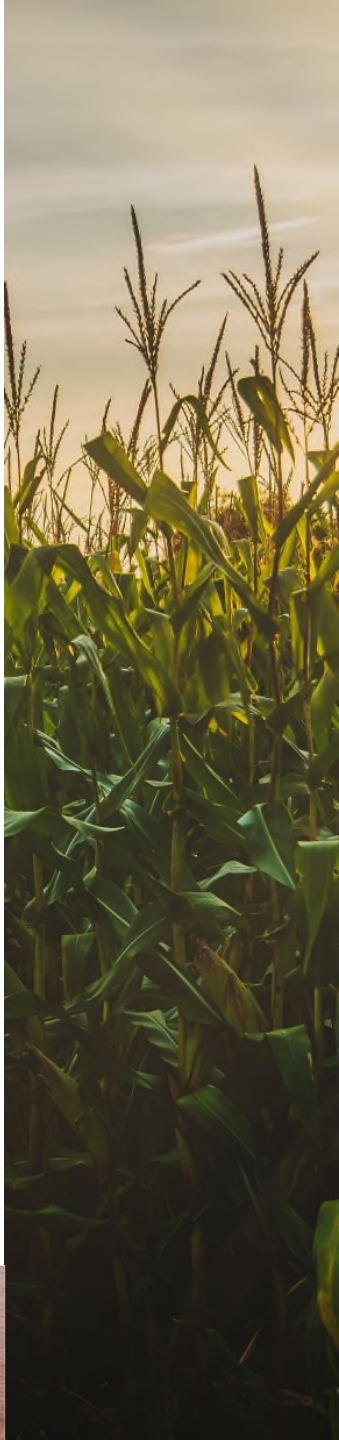
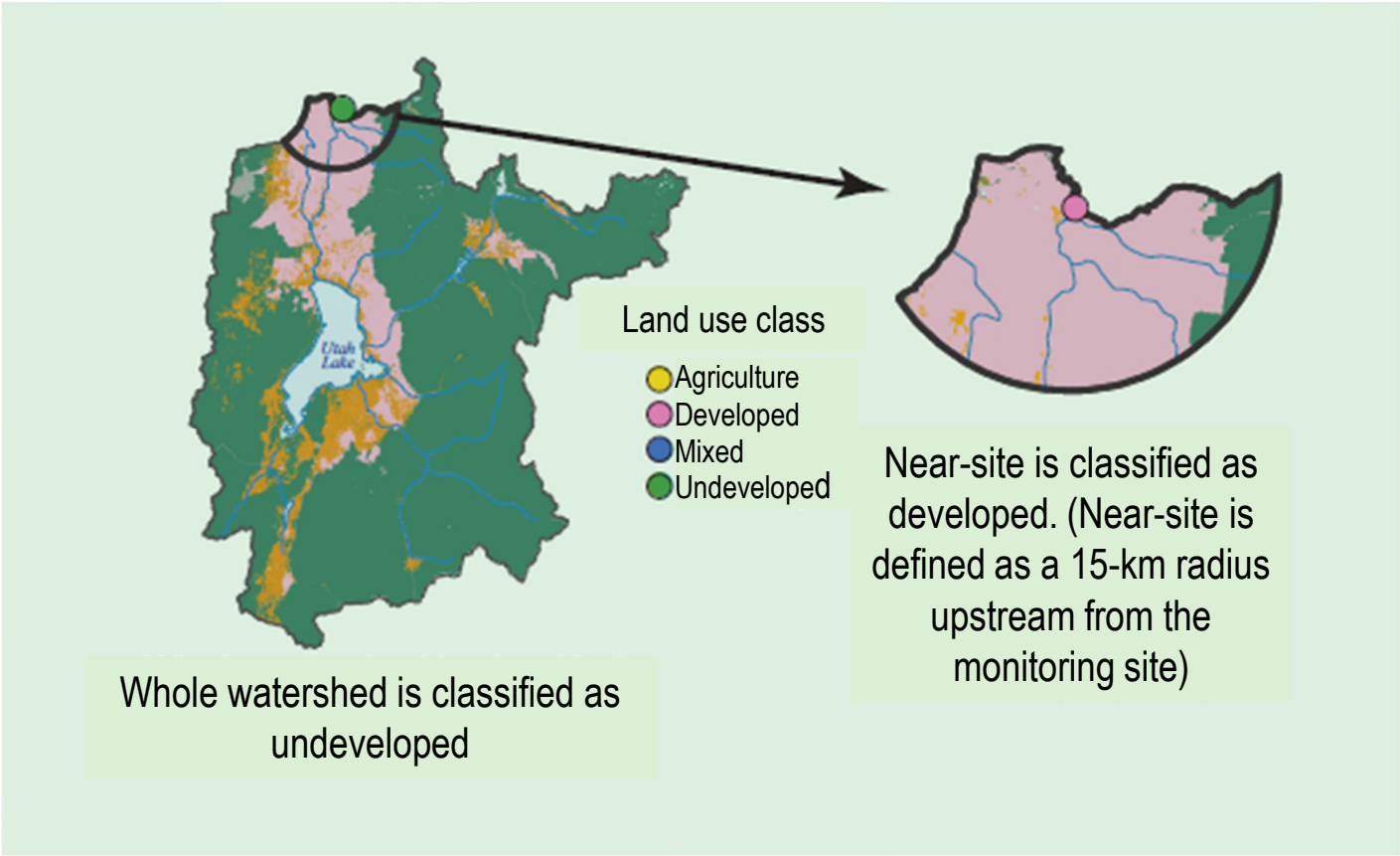
Sites classified by:
LAND USE WHOLE WATERSHED



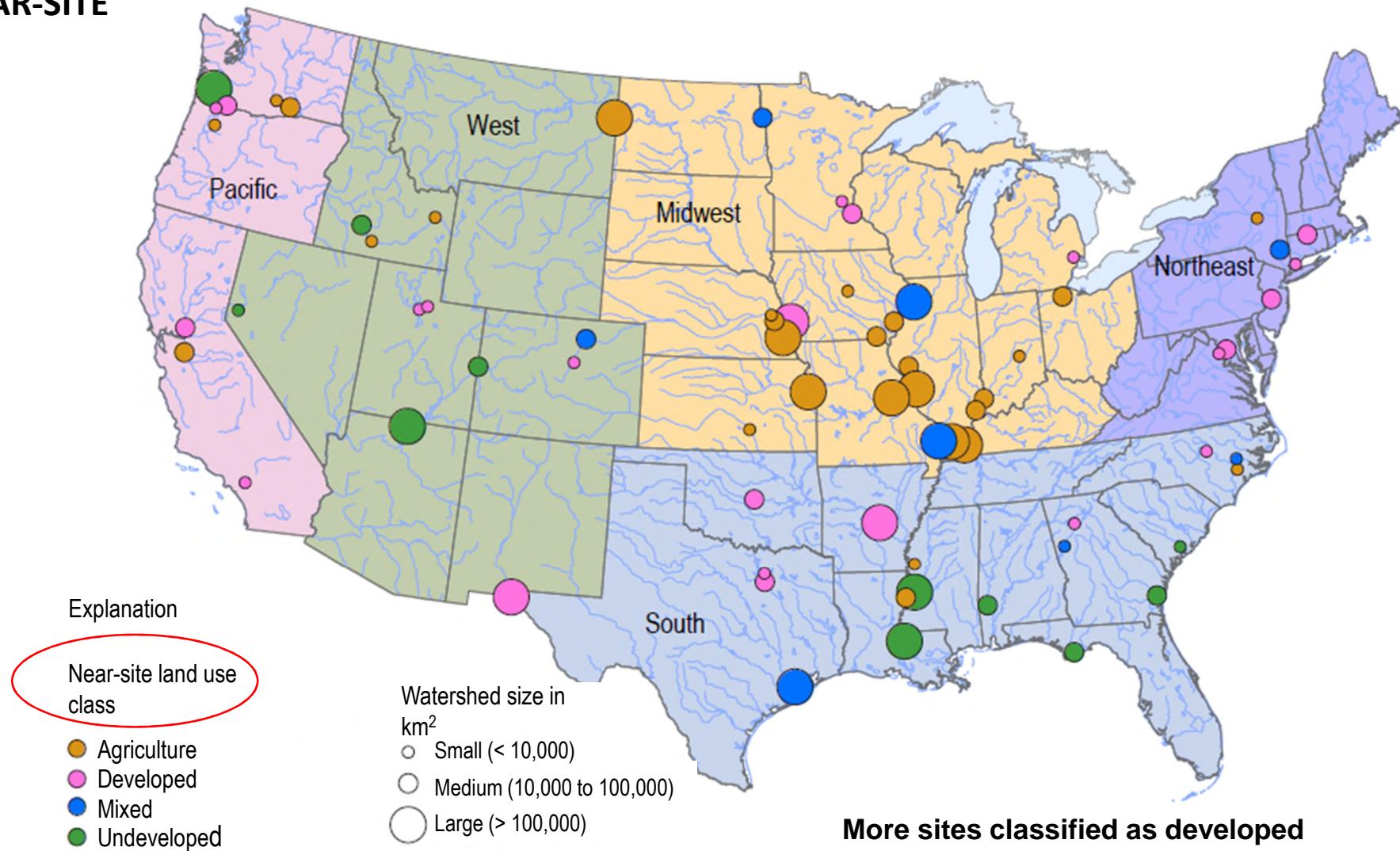
Regions defined by similar crop patterns



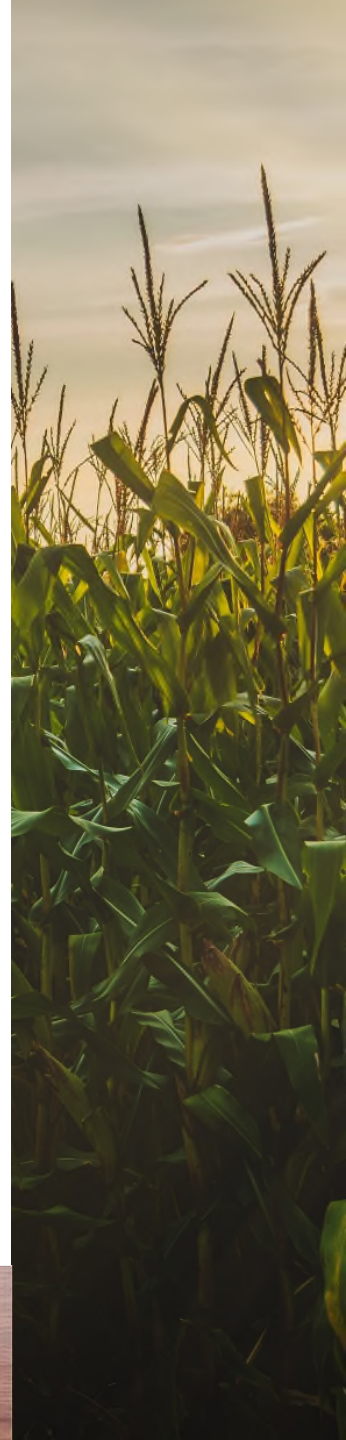
Calculation of:
LAND-USE NEAR SITE



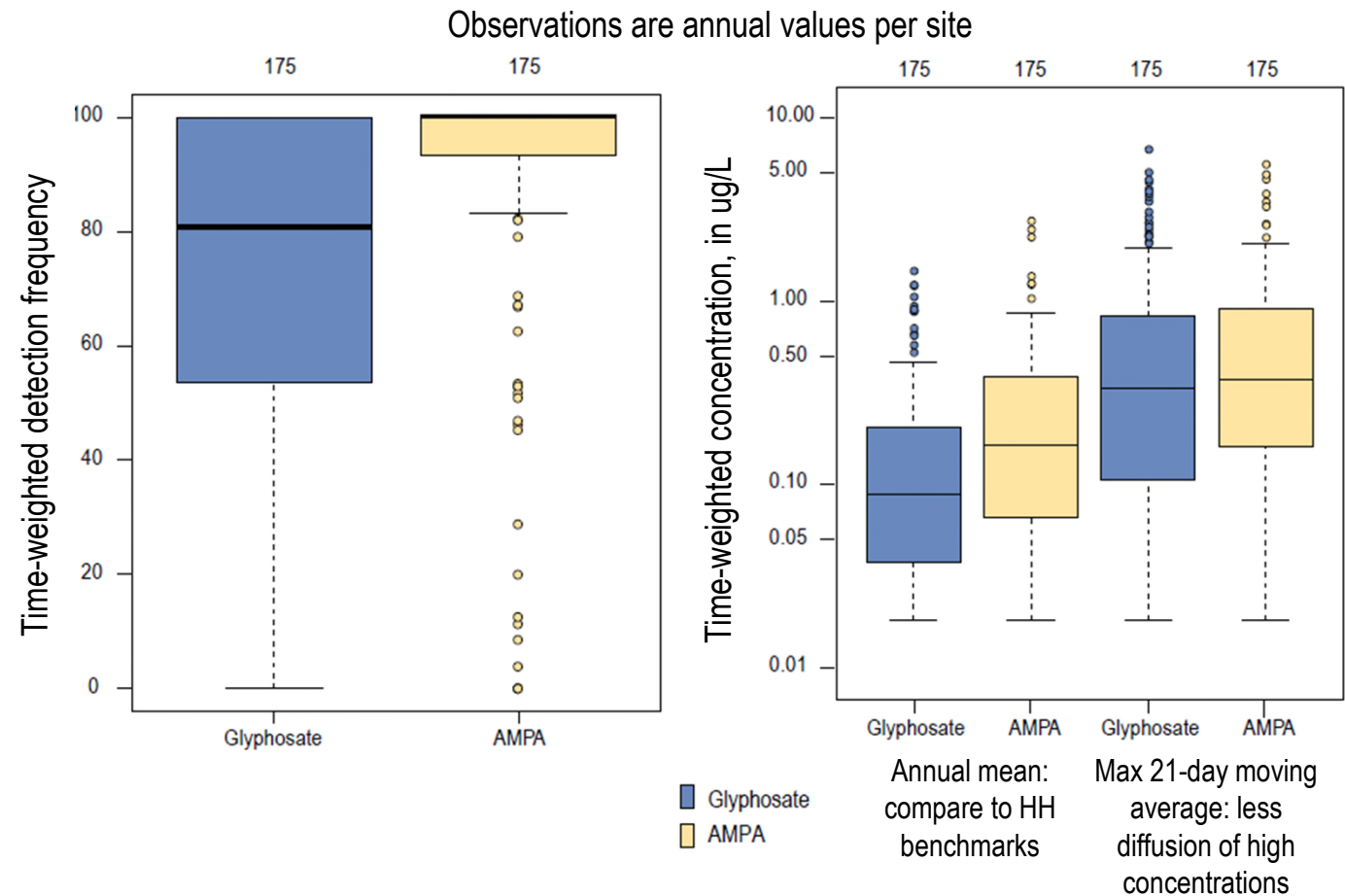
Sites classified by:
LAND USE NEAR-SITE



Preliminary information – subject to revision.
Not for citation or distribution.



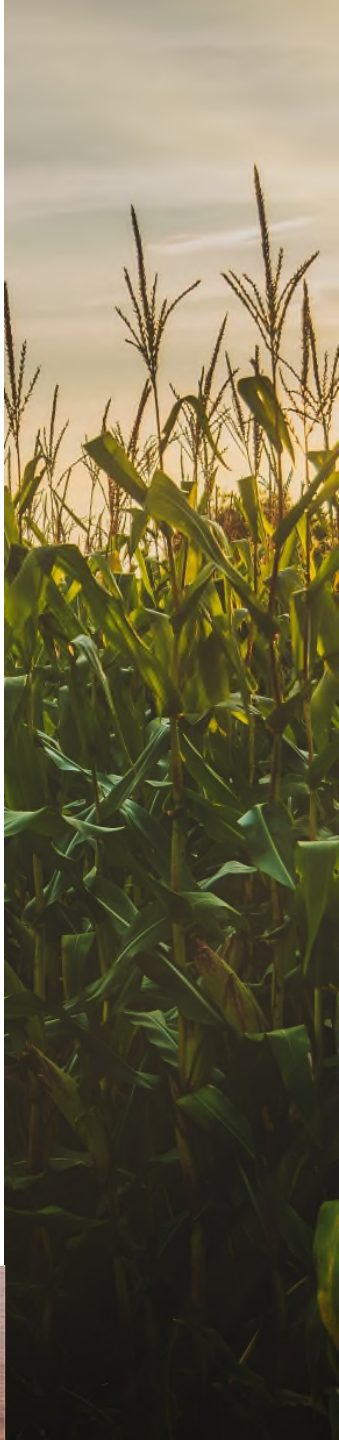
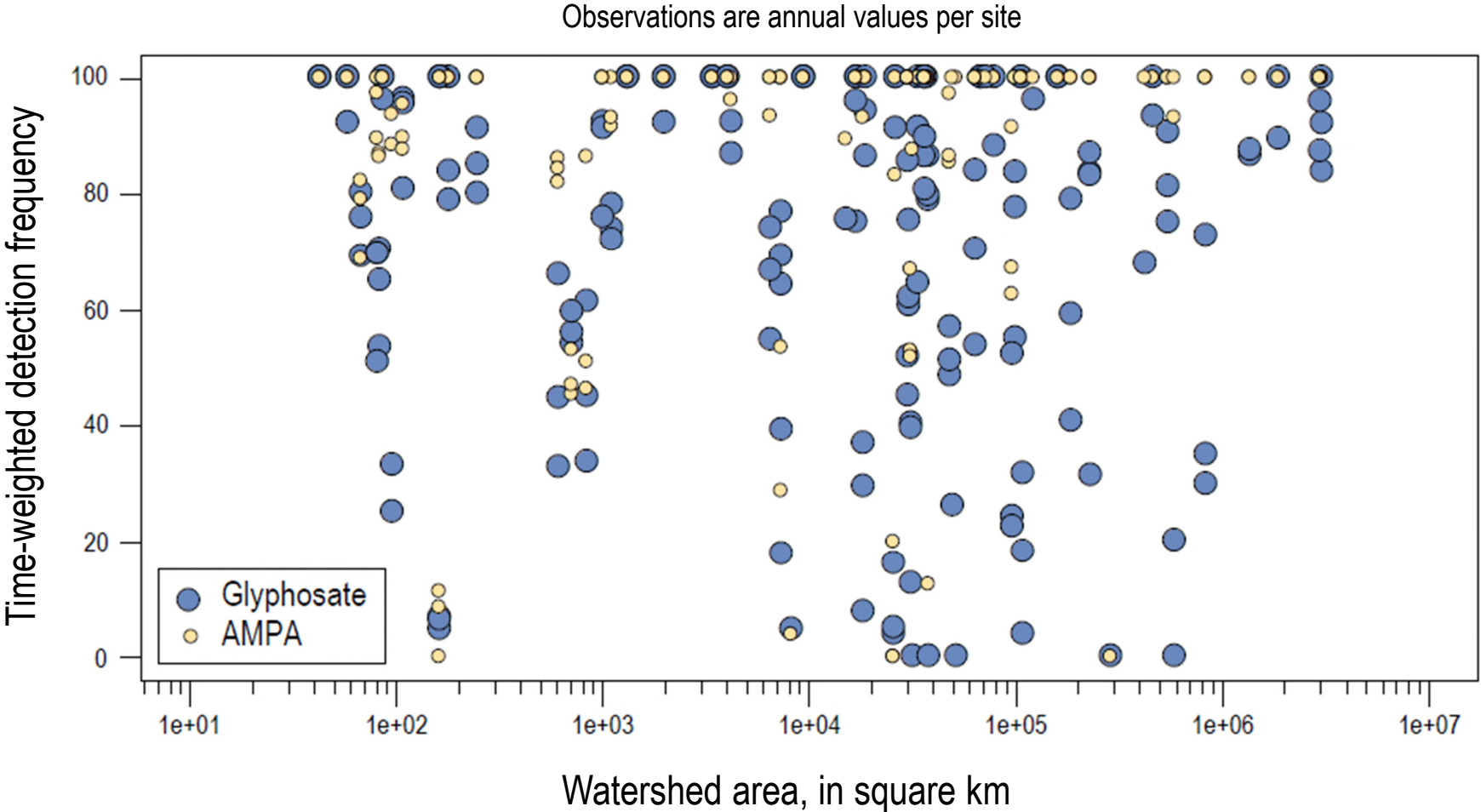
Detection frequency and concentration by:
ANALYTE



Preliminary information – subject to revision.
Not for citation or distribution.



Detection Frequency by:
WATERSHED SIZE



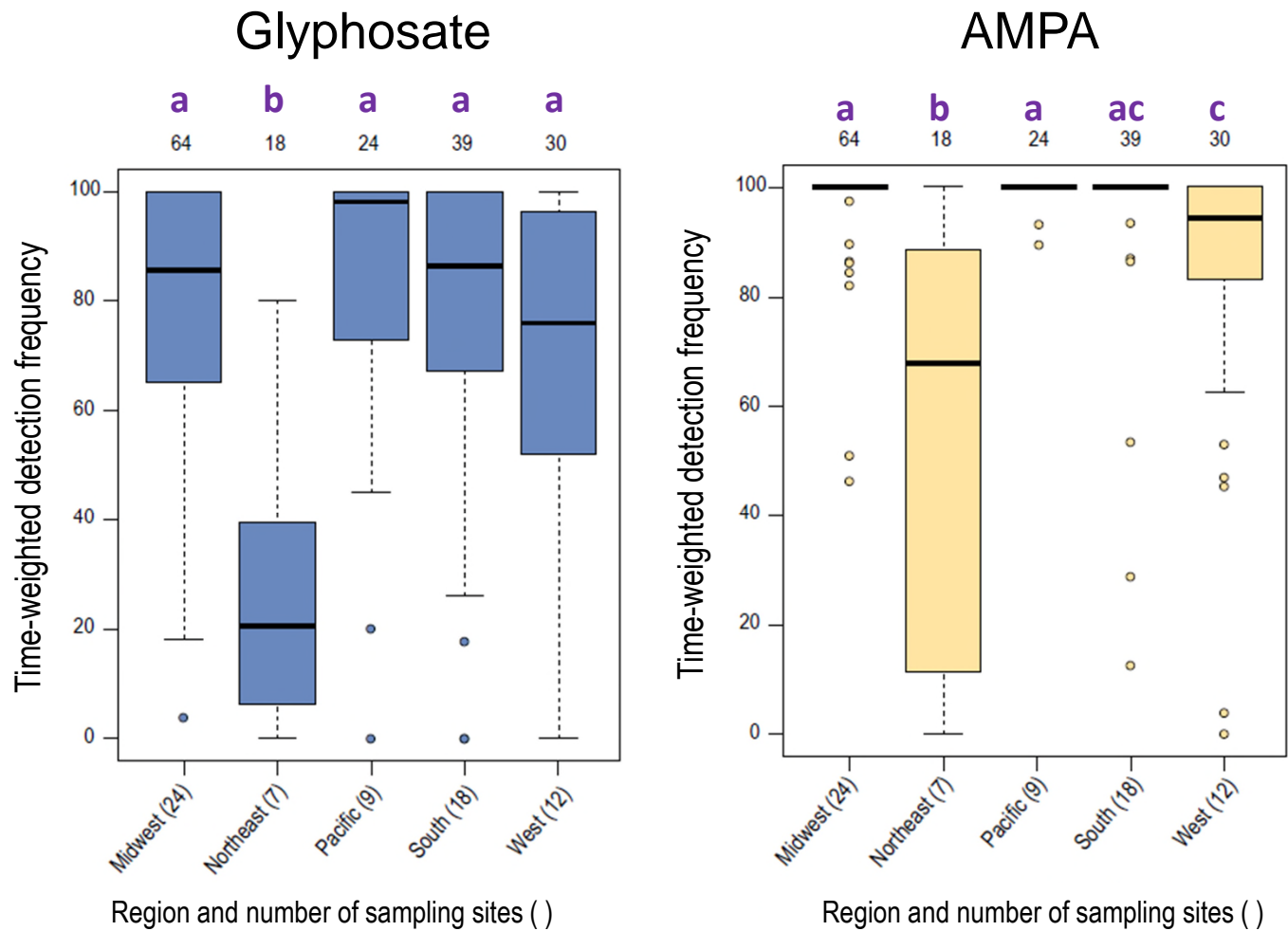
Preliminary information – subject to revision.
Not for citation or distribution.



Detection frequency contrasting:

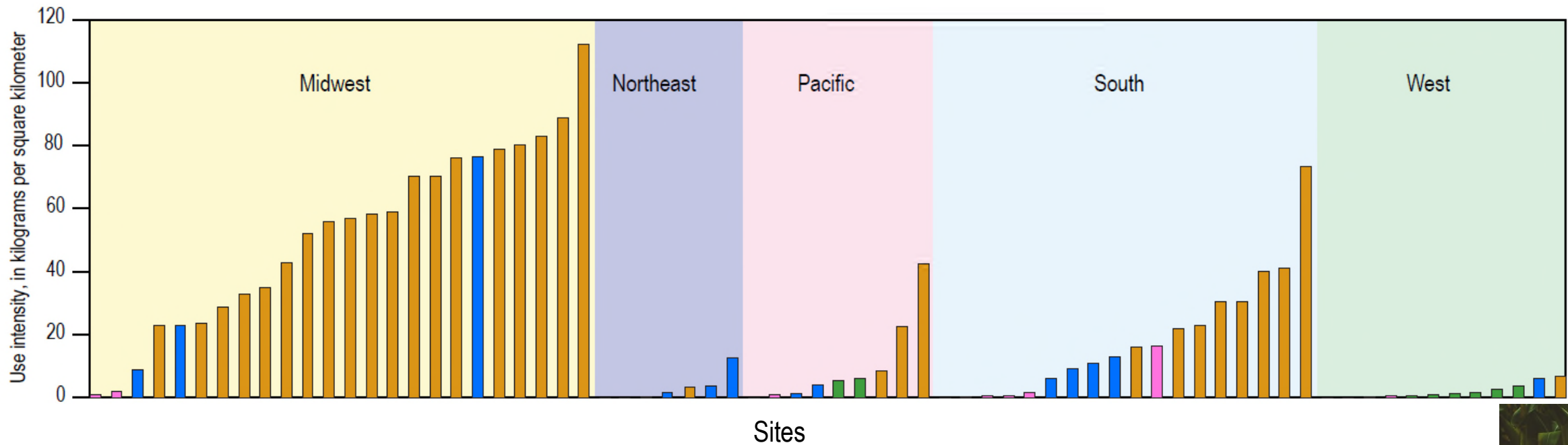
- ANALYTE
- REGIONS

Observations are annual values per site



Preliminary information – subject to revision.
Not for citation or distribution.





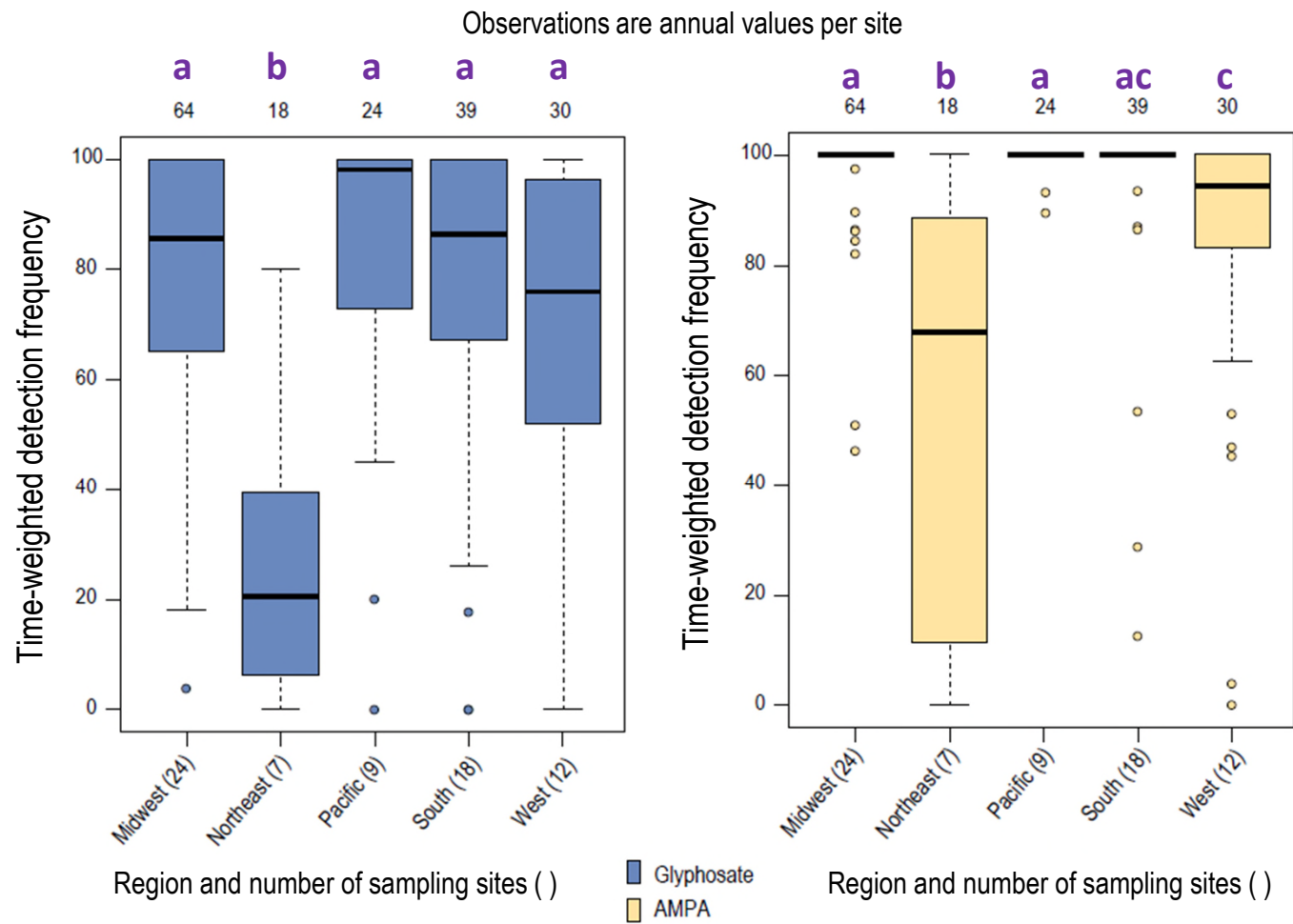
Whole watershed land-use class

- Agriculture
- Developed
- Mixed
- Undeveloped

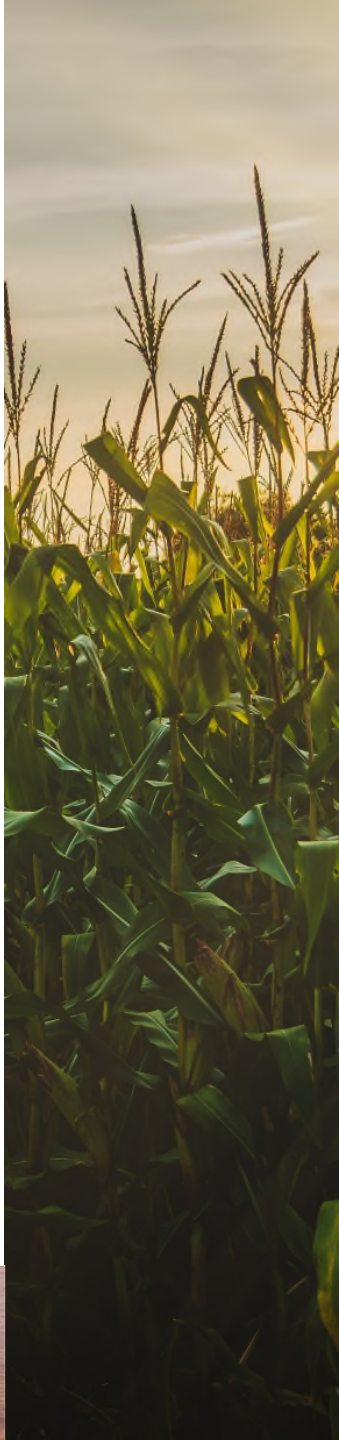


Detection frequency contrasting:

- ANALYTE
- REGIONS



Preliminary information – subject to revision.
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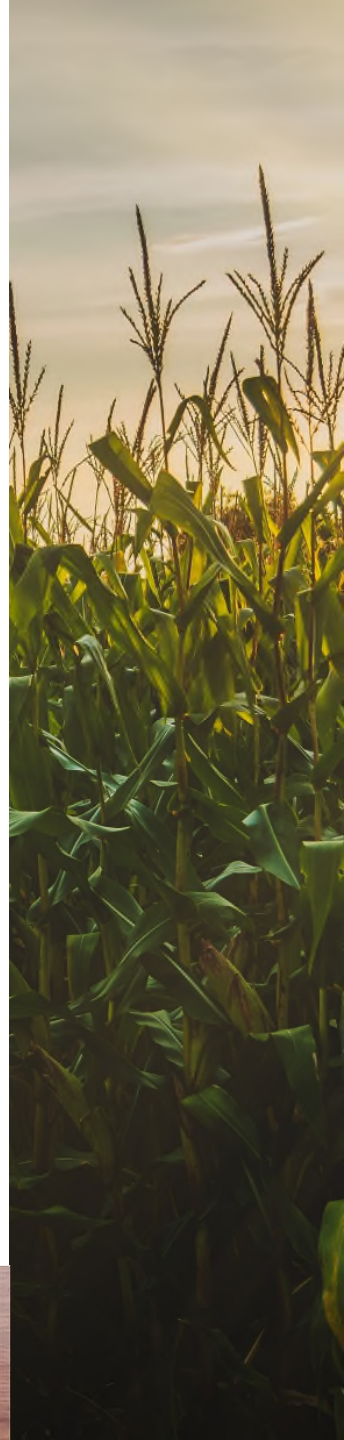
Why does glyphosate, which degrades faster than AMPA (8x), occur nearly as frequently as AMPA and at similar concentrations?

Based on literature and select site info/results:

- Glyphosate is controlled by overland flow and direct drainage (quick processes)
- AMPA is also controlled by degradation rates (slow process)



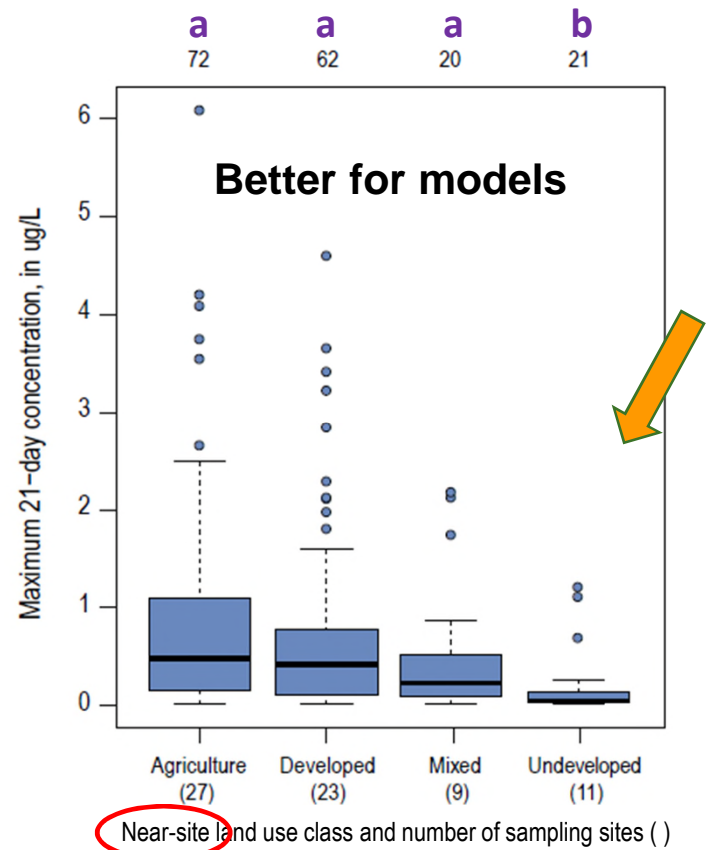
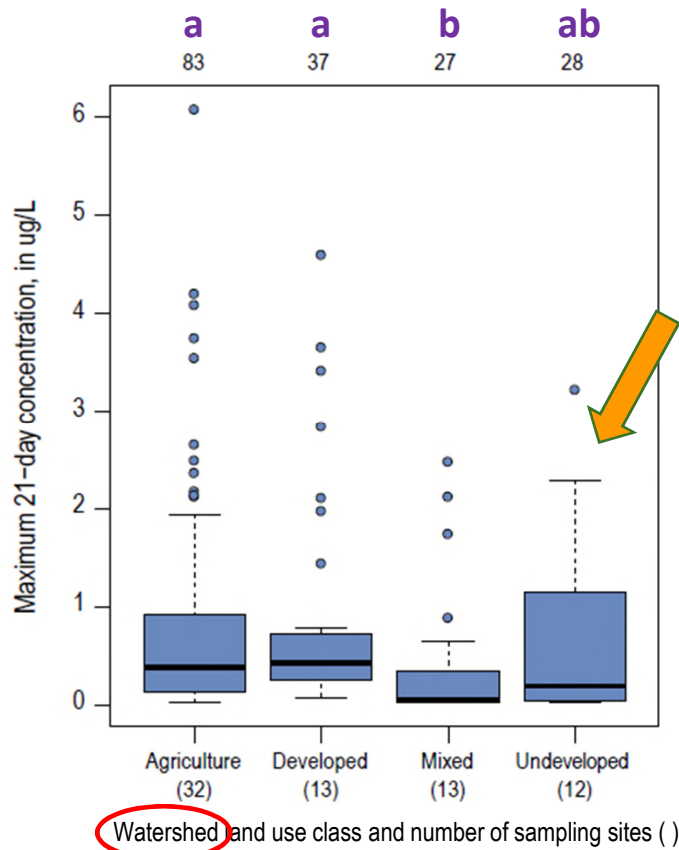
Preliminary information – subject to revision.
Not for citation or distribution.



Glyphosate concentration contrasting:

- LAND USE WHOLE WATERSHED
- LAND USE NEAR-SITE

Observations are annual values per site

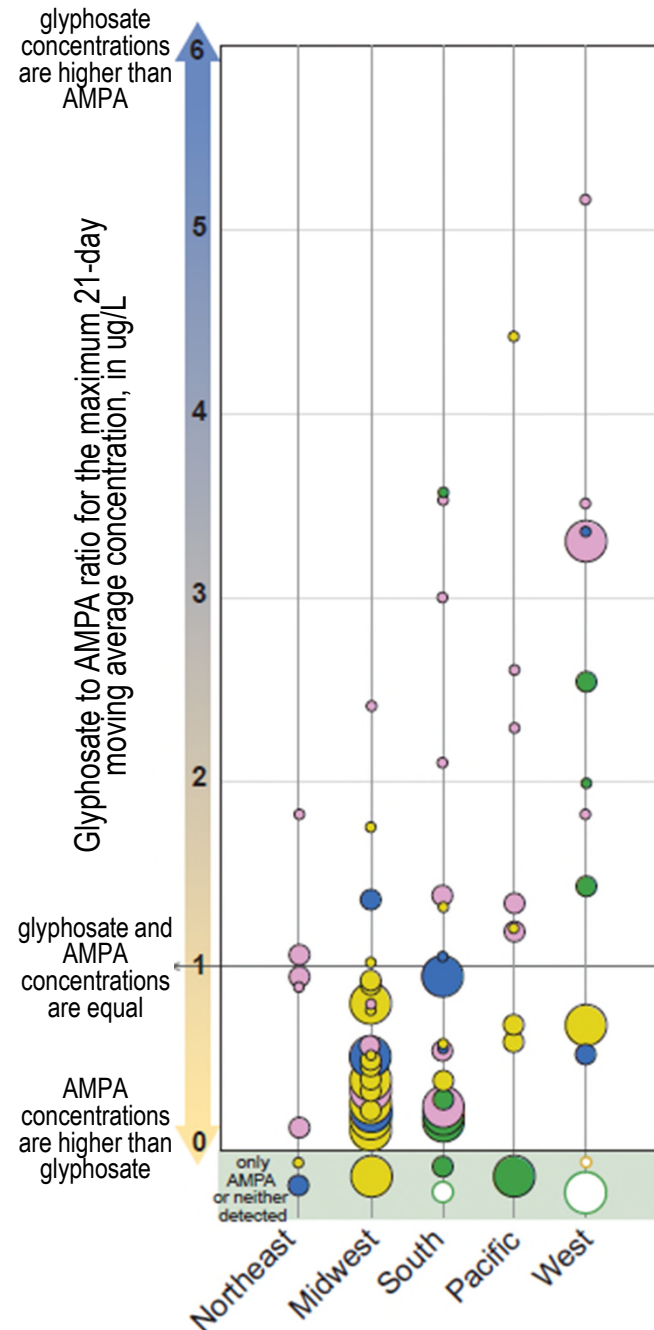


Preliminary information – subject to revision.
Not for citation or distribution.



Concentration ratios contrasting:

- **REGION**
- **SIZE**
- **LAND USE NEAR-SITE**



One ratio per site calculated from the median of annual concentration (time-weighted max 21-day moving ave) for glyphosate and AMPA



Ratio could not be determined for symbols in the shaded area because only AMPA was detected at the site or neither AMPA nor glyphosate (unshaded symbol) was detected at the site.



Preliminary information – subject to revision.
Not for citation or distribution.

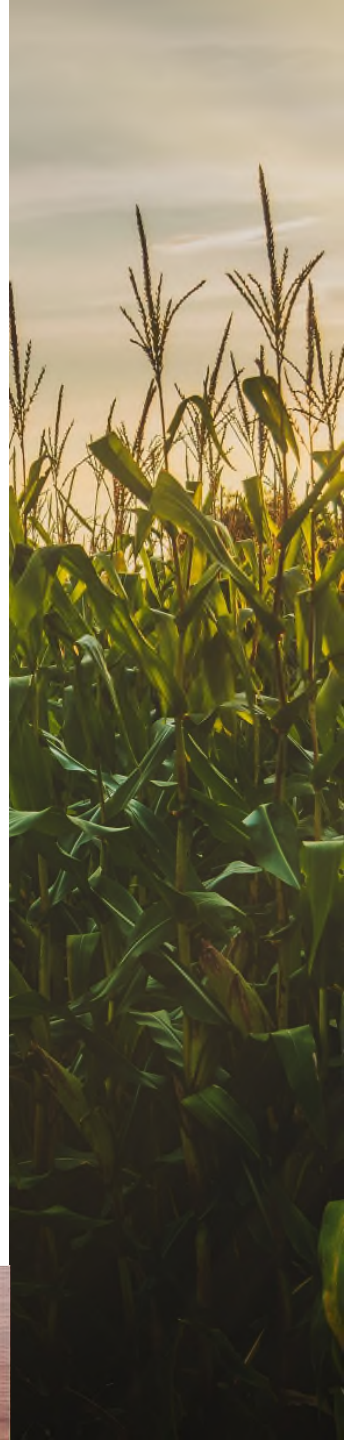


Summary and conclusions

- Glyphosate & AMPA are nearly ubiquitous in 70 streams
- Found in all regions, watershed size, type of land use
- Concentrations and detection frequency lowest in Northeast
- Sites in Midwest, South, Pacific had similar concentrations and detection frequencies of glyphosate & AMPA: non-ag use & use on developed land are important
- Near-site is more indicative than whole watershed land use and can improve models
- More glyphosate found in streams that have less opportunity for degradation (generally small and also dry, tile drained, and/or impervious)
- No current human or aquatic-life benchmark is exceeded



Preliminary information – subject to revision.
Not for citation or distribution.

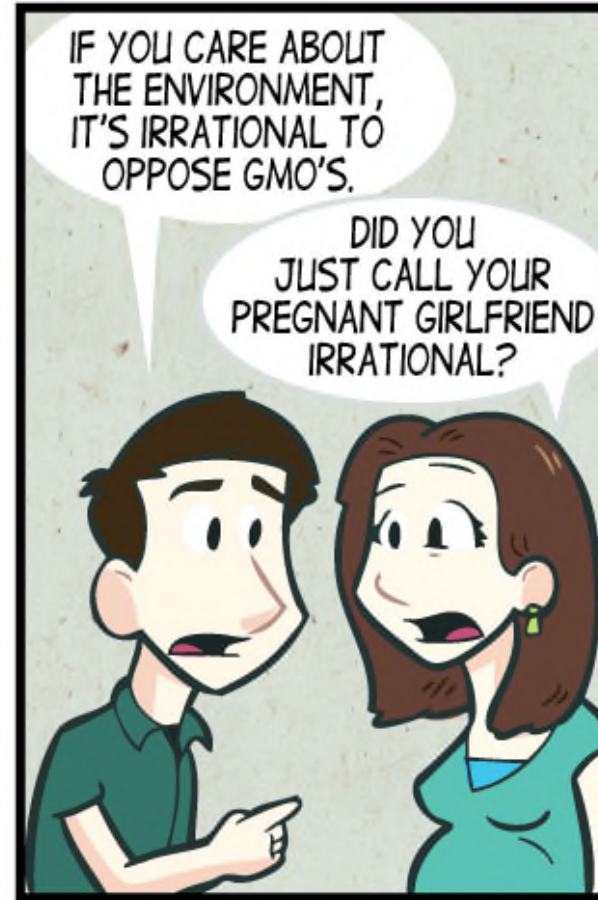


CARBON DATING

A COMIC STRIP ABOUT SCIENCE, PSEUDOSCIENCE, & GEEKY RELATIONSHIPS



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ART BY @ELISAWIKEY



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